

Claims 20-34 have been withdrawn and cancelled in this application. The remaining claims are as below.

Listing of Claims:

1.(currently amended) A method for the microstructuring of an optical waveguide to produce an optical waveguide having a first cross-sectional region with a first refractive index, a second cross-sectional region with a second refractive index, a protective buffer, and a boundary region in the transition from the first to the second cross-sectional region, wherein said first cross-sectional region is composed of undoped silica, wherein at least one defined portion of the boundary region is provided with a modification of at least one optical property of the optical waveguide, said modification being a non-periodic distribution, formed by a defined portion of the boundary region defining at least one of (i) microdamage, and (ii) a surface defined by the removal of material from the defined portion, [aaccording to claim-20,] comprising the steps of:

providing an optical waveguide comprising a first cross-sectional region having a first refractive index, a second cross-sectional area having a second refractive index, a protective buffer, and a boundary region in the transition from the first to the second cross-sectional area,

exposing the optical waveguide through its protective buffer to laser radiation in the form of at least an ultra-short single pulse or a sequence of ultra-short pulses with a defined energy input;

at least one of microdamaging and removing the material from the defined portion of the boundary region with said laser radiation: and

modifying at least one optical property of the optical waveguide at one said defined portion at least of the boundary region as a result of the step of exposing the optical waveguide to laser radiation, without removing said waveguide's protective buffer.

2. (previously presented) The method according to claim 1, wherein the modifying step includes changing the refractive index of the material of the first or of the second cross-sectional region or both.

3. (previously presented) The method according to claim 1, wherein the modifying step includes creating a scattering center by said microdamage or by said removal of material.

4. (previously presented) The method according to claim 1, wherein the modification step includes transforming the phase of the material of the first or of the second cross-sectional region.

5. (previously presented) The method according to claim 1, further comprising the step

of selecting the laser radiation in such a manner that at the defined portion of the boundary region a charge carrier plasma with a charge carrier density dependent on the desired modification is produced.

6. (original) The method according to claim 5, in which the laser radiation comprises a power density of roughly 10^{10} W/cm² or of more than 10^{10} W/cm².

7. (original) The method according to claim 6, in which the laser radiation comprises single pulses having a duration of roughly 10^{70} seconds or of between 0.1 ps and 50 ps and an energy of roughly 10 nanojoules (nj) or less than 10 nanojoules (nj).

8. (previously presented) The method according to claim 6, further comprising the step of selecting the wavelength of the laser radiation is chosen so that the optical waveguide is transparent in the light path up to the defined portion of the boundary region for light of the chosen selected wavelength up to a power density of roughly 10^{16} W/cm².

9. (previously presented) The method according to claim 1, further comprising the step of focusing a laser beam is focused onto the defined portion of the boundary region by means of a microscope lens.

10. (previously presented) The method according to claim 1, further comprising the step of irradiating a laser beam is irradiated so that it enters the optical waveguide at an angle of 90° to an outer face of said optical waveguide at the point of impact.

11. (previously presented) The method according to claim 1, further comprising the step of guiding a laser beam through an immersion fluid before entering into the optical waveguide.

12. (previously presented) The method according to claim 1, further comprising the step of producing the modification in such a manner that at the respective portion of the boundary region light can be coupled out of the waveguide or that light can be coupled into the waveguide at the respective portion of the boundary region, or that light can be coupled in and also coupled out at the respective portion of the boundary region.

13. (previously presented) The method according to claim 1, further comprising the step of producing the modification on a plurality of defined portions of the boundary region in such a manner that from the modified boundary region portions a radial radiation of defined, uniform light intensity takes place when light is coupled into the optical waveguide at one longitudinal end.

14. (previously presented) The method according to claim 1, further comprising the step of producing the modification is produced at a plurality of defined portions of the boundary

region in a longitudinal direction of the optical waveguide, or in a direction perpendicular thereto, or in both mentioned directions of the optical waveguide, in such a manner that an optical grating, a spiral, a cross, a photonic bandgap structure, a combination of lines and dots, or a combination of any of the above-mentioned structures, is produced.

15. (previously presented) The method according to claim 1, further comprising the step of moving the optical waveguide relative to the laser beam or moving the laser beam relative to the optical waveguide.

16. (original) The method according to claim 1, in which the first cross-sectional portion is an optical waveguide core and the second cross-sectional portion is an optical waveguide cladding.

17. (previously presented) The method according to claim 1, in which the optical waveguide comprises from the inside to the outside more than two cross-sectional portions having different refractive indices and a corresponding number of boundary regions of adjacent cross-sectional portions, and wherein the method further comprises forming said modifications at more than one boundary region.

18. (original) The method according to claim 1, in which the optical waveguide comprises a continuous cross-sectional profile of the refractive index, and in which the modification takes place in at least one pre-selected cross-sectional portion.

19. (canceled)

20-34 (withdrawn and cancelled)

35.(new) A micro-structured optical waveguide product manufactured according to the method of claim 1.